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UNDERWATER DEMOLITION TEAM TWO

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UNDERWATER DEMOLITION TEAM TWO

MEMORANDUM 30-52

29 JAN 52

From: Submersible Operations Officer
 To: Commander Underwater Demolition Unit TWO
 Via: Commanding Officer, Underwater Demolition Team TWO
 Subj: Sneak Attacks

1. To date the nations which have exhibited the most active interest in sneak attacks as a naval weapon have been Italy, Japan, England and Germany. Each of these nations has made notable contributions to the development of effective sneak attacks, but only Italy and England scored notable successes with such attacks in World War II.
2. The extent of Russian endeavor in this field is not known by this command, but it is known that the Russians have captured from the Germans numbers of very excellent sneak craft, as well as the technicians that built them, and it must be presumed that Russia has not allowed these gifts to remain unexploited.
3. The U.S. has exhibited very little active interest in sneak attacks as a weapon, and has never even built a craft for this purpose. In 1948 UDTLant acquired from the English 4 SBB's (Sleeping Beauty) in which submersible training has been conducted. These craft, however, due to their limited range and speed, have not been regarded as operational boats, their main value being as training craft. The Office of Naval Research became interested in sneak attacks to the extent of influencing CNO to direct BuShips to design a sneak craft for the combined purposes of beach reconnaissance and transport of explosives. But the proposed design did not survive the criticism of the design section of the Dept. of Submarines, which is not in sympathy with the idea of sneak attacks. However, OR has succeeded in getting activated an English Welman, discovered stored in a warehouse on the Submarine Base at New London, and this craft is supposed to be ready for tests by UDTLant in April 1952. In addition, OR procured two SSB's from the Italians, one of which will be ready for tests soon after 1 January 1952. OR has also been extremely active in other phases of UDT development e.g., SCUBA's compasses, depth gauges, rubber suits, etc., and is in fact largely responsible for considerable recent developments in UDT's.
4. There has been a recent increase in interest in the U.S. Fleet, notably on the part of the Amphibious Force, in sneak attacks. However, the interest has been from the standpoint of defense, rather than offense, and the considerable number of sneak swimmer attack exercises which have been conducted throughout the Atlantic Fleet have been mainly to acquaint the U.S. ships with sneak

techniques. Of course, there does not exist in the U.S. Navy an organization primarily concerned with development and delivery of sneak attacks, and thus, since their primary mission involves swimming, UDT's have been directed to conduct the exercises.

5. However, it is felt that these exercises can accomplish little more than to make the Fleet "sneak attack conscious". For UDT's are in no way capable of delivering a realistic attack, and for this reason the defenses evolved by the ships must be carefully reviewed, for the problems of defending against surface swimmers launched from surface craft are considerably different from those of defending attackers who are trained and equipped for sneak attacks and who are able to choose conditions most favorable for their success. The following outline of sneak attack possibilities has been prepared as a possible aid to ships interested in preparing anti-sneak attack defenses. However, it must be borne in mind that this outline is no "bible", and has been prepared without the benefit of experienced criticism.

6. In this outline sneak attacks will be divided into two broad categories: (a) Stealthy, which includes attacks by swimmers and by sneak craft, depending on stealth and avoiding of detection for their success; and (b) Deceptive, which are intended literally to deceive the enemy by disguising agents or equipment, or both. The first category will be subdivided into four phases: (a) Position, by which is meant transporting of craft or swimmers, or both, to the immediate area of the attack so that the operations may be conducted; (b) Approach, which means the transporting of explosives to the target; (c) Attack, which is the delivery of the explosives; and (d) Retirement, which is the escape. The second category will be subdivided into two general headings: (a) Espionage and (b) Masquerade, which includes disguised boats, etc. Outline follows:

a. STEALTHY

1. Position

a. Shore-based. Obviously the attacker is in the most favorable possible circumstances if he is close enough to his target to be able to launch his sneak craft, or better yet, his swimmers, from the shore; for he will be able to pick the most advantageous time for attack, he will have the greatest possible leeway in making last-minute changes in his attack plan, even to postponement, and the problem of his escape after delivering his attack will certainly be minimized, since he will not have to make rendezvous with another craft. This was the situation with the Italians in their highly successful attacks at Gibraltar and almost all of the many German sneak craft were shore-based. In attacking U.S. shipping on this continent, of course, the enemy would not have the advantage of being shore-based, since no sneak craft is known to have sufficient range for this. But in most cases such as the European and in many Asiatic harbors shore-based attacks are very possible and must be anticipated.

b. Surface Vessels. It seems unlikely that swimmers would be launched from a surface vessel, except as discussed later under the category of DECEPTION, for the mother ship would have to approach to within at least two miles of the target, and the likelihood of detection would probably not justify the risk, it is very possible, however, for sneak craft to be positioned by surface vessels. For example, the British X-craft could be launched as far as 600 miles from the target, could execute the attack, and return to rendezvous with the mother vessel. This craft displaces only about 25 tons and is designed to be towed, so that transporting it is not difficult. Of course, this means of positioning is not the most desirable, since the risk of detection at sometime during the operation would probably be high; but it should not be overlooked, especially as noted under this category of DECEPTION.

c. Aircraft. As far as is known by this command, development in this field has been limited. It is known that the English have experimented with dropping the Welman from an aircraft, but the results of the tests are not available to this command. Certain tests have been conducted in parachuting swimmers from aircraft, but the results are not sufficiently conclusive for comment here.

d. Submarine. Because of the relative security afforded by this method of positioning it is by far the most desirable of the four listed possibilities. The British X-craft's for their successful attacks on the Tirpitz in Norway and on the Japanese cruiser Takao in Singapore were towed to position by fleet-sized submarines. It is unlikely that a swimmer attack would be launched from a submarine larger than the X-craft, for a torpedo with greater range than a swimmer could be used with less risk to the submarine. But any harbor within range of enemy submarine, as are all U.S. harbors, are liable to attacks by sneak craft, and thus these considerations may be worthy of note:

1. Sneak craft, properly manned and handled, are capable of penetrating harbor defenses that would be impregnable to fleet-size submarines.

2. Such craft are capable of carrying at least two torpedoes or as much as 7500 pounds of explosive.

3. As mentioned before, our present enemy is known to have captured numbers of excellent German sneak craft, as well as the technicians and designers concerned with their development and production.

2. APPROACH

a. Surface. The risks involved in a surface approach, either by swimmer or sneak craft, except as noted under the category of DECEPTION, are such as to make such an approach unlikely.

This is not to say that defensive measures may neglect the surface entirely, for the difficulty of submerged navigation makes it desirable for both swimmers and sneak craft to cover part of their route to the target on surface. But in either case only the head of the attacker breaks surface, and a man's head on surface at night is practically impossible of detection from a ship until he is within a range of about 150 yards.

b. Subsurface. A well-planned sneak attack, either by swimmer or by sneak craft, will almost always utilize a subsurface approach. It has been found by UDTsLant that from the deck of a ship at night, even in very clear water (e.g., St. Thomas), detection of properly camouflaged swimmers equipped with re-circulating type SCUBA's is extremely difficult, if not impossible, at a depth of 20 feet, and there is no reason to believe that a sneak craft would be any more detectable. Almost all of the successes by the Italians and the English were scored by means of underwater approaches, and the Germans achieved notable successes in subsurface attacks on dock and harbor installations on the Rhine River and in French and Belgian ports.

3. ATTACKS:

a. Towed explosives. Swimmer attacks, in which the attacker tows his explosive to the target (partway on surface), may be delivered from as great a range as two miles. It now seems that within a very short while UDTsLant swimmers will be capable of towing charges of at least 300 pounds underwater for about this distance. Explosives may be attached to the target in a number of ways, but the two most promising means, both of which were popular with Italian and English swimmers were: (1) attaching the charges to the hull by means of a very strong permanent magnet, and (2) hanging the charge underneath the keel from a line running between the bilge keels, fastened by means of clamps. In either case a time delay fuze allows the swimmer to escape before the charges explode.

b. Explosives carried by sneak craft. Explosives charges carried by sneak craft are usually in the form of detachable war heads, a favorite method with the Italians and the Japanese, or in blister compartments on the sides (e.g., the X-Craft). Both the magnet and the keel suspension methods of attaching explosives were used. In the case of the bilge keel suspension, it was necessary for the operator (s) to anchor their craft and perform as swimmers while rigging the lines and placing the charge. But if a magnet were used, the operator simply nudged the target with the bow of his craft and tripped a release controlled from the cockpit, detaching the warhead from the craft. The latter method is quicker, but is adversely affected by marine growth on hulls.

c. Torpedoes. Torpedoes were so widely used by English, Germans, Japanese, and Italians, most craft being designed to carry either one or two, depending on the size and range of the boat. The disadvantage of this method, of course, is the security is lost when the torpedo explodes. The Japanese attempted to overcome this disadvantage by

by designing a torpedo with a range of about 250 yards, which had a magnetic nose by means of which it could attach itself to the side of the target and explode after a suitable time delay, allowing the attacker to make good his escape. This method, however, is regarded more as interesting than as having practical value.

4. Retirement

a. Return to Parent Vessel. In the case of sneak craft considerable navigation may be necessary to effect a rendezvous with the mother vessel, particularly if the parent is a submarine. If the rendezvous is far enough from enemy territory, light signals may be used, but the risk is always considerable. Infra-red homing is both possible and practical, as is underwater sound. In the case of swimmers, at present the only reliable homing device is a line from the parent vessel to the target, paid out by the swimmer as he approaches the target. However, it is obvious that such a method is impractical, and there are under development both infra-red and underwater sound gear, by means of which it is hoped that the swimmer or sneak craft may be able to return to the home vessel with a minimum of difficulty.

b. Return to Base. Obviously the attacker's homing problem is considerably simplified if his target is within range of a base to which he may return, for the reasons that (1) he may avail himself of landmarks to aid his navigation; and (2) his time limitation is not likely to be so important, i.e., he is returning to base instead of making rendezvous.

c. "Pick-up" by Aircraft. This is not a form of sneak attack which would ordinarily be undertaken by UDT's, for careful training of a very special nature would be required to prepare agents for such activity. Nevertheless, in view of the fanaticism of many adherents to the philosophy of the enemy who are active in the U.S., it is a possibility which must be seriously considered. At least three methods could be employed in attempts to damage U.S. vessels: (1) Enemy agents could board U.S. vessels with false orders and identification and pose as members of ships' company for extended periods. Trained agents could wreak extensive damage over a period of time and make it appear to be accidental; (2) Members of the U.S. Armed Forces could be proselyted by enemy agents and influenced to perform acts of sabotage; (3) Agents might gain illegal entry to US. ships docked or at anchor and remain aboard long enough to accomplish considerable damage.

2. Masquerade

a. Disguised boats. Possibilities in this field are many. Enemy attackers could be carried in bum boats, fishing vessels, commercial craft, pleasure boats, ferries, etc., and any excuse could be used to approach close enough to the target to deliver an attack. The attack itself could be delivered in number of ways. For example, underwater swimmers with explosives might be towed to within range of the target, in which case the disguised craft might not approach

closer than a mile; or disguised craft might launch swimmers and explosives upstream of the target and dump debris on the surface of the water to cover their approach. Japanese using this technique were unsuccessful, but it was mainly because they lacked proper equipment. Of course, the danger from such attacks seems insignificant in home waters since it might be very difficult to effect the necessary extensive preparation, i.e., rigging the boat, procuring the explosives, etc. But in foreign ports these attacks may prove to be a real menace.

b. Captured Equipment. It is possible that a resourceful enemy might make use of captured naval equipment, i.e., boats in executing a sneak attack. On the recent exercises at Vieques a sneak attack boat disguised as a modified LCP(R) was taken into custody by an alert patrol boat, but it would have been hoisted aboard the capturing vessel without having been searched, had it been equipped with proper slings. Many schemes might suggest themselves to a canny adversary, once he has acquired U.S. equipment, i.e., a boat, a vehicle, etc.

7. The recent interest in sneak attacks displayed by the U.S. Fleet is thought to be very timely, for such attacks could prove to be a real menace to certain types of naval operations in the future. As observed before, however, it is felt that the sneak exercises which have been carried out to date have accomplished little more than to make the Fleet "sneak-conscious". The reason for this seems to have been:

a. For lack of both suitable equipment and experience UDTsLant, who have conducted the exercises, have not been able to approximate a satisfactory degree of realism in their simulated attacks. The result of this has been that in many cases the ships have received erroneous impressions of sneak attacks, and many of the defenses that have been developed, though effective against the UDTsLant attacks, would be inadequate against a well-developed attack, in fact, some of these defenses may even aid the attacker at times. Worse than this, it is feared that the ships which have had success in defending against the UDTsLant exercises may be inclined to belittle the threat of well executed sneak attacks.

b. The conditions governing the exercises have not been well defined, with the result that there has been some confusion concerning the claimed successes or failures of attackers. In order to stimulate interest in the exercises it is well to conduct them on a competitive basis; but heretofore the confusion concerning conditions which apply have given rise to a "cops-and-robber" spirit in which the purpose of the exercises has been lost.

8. Provided that certain classes of equipment presently under development or in process of being procured become available UDTsLant may be able to improve the quality of their sneak attack exercises.

However, for the present, in order to realize the maximum value from the exercises a cleared definition of governing conditions is indicated. Each exercise should assume a general situation (i.e., friendly forces, enemy forces and capabilities, enemy disposition, etc.) and rules defining captures, successes, safety precautions, etc., should be drawn up. Preliminary to such a treatment of procedure for sneak attack exercises, however, the present capabilities of UDTsLant must be determined, along with the defensive measures most used by the ships. The general sneak attack capabilities of UDTsLant follow:

a. STEALTHY

1. Position

a. Shorebased. This is the most usual means for positioning UDTsLant sneak attackers. The base may be the UDT base at Little Creek, or it may be near the landing beaches used for amphibious exercises. It is not usual, however, for anchorages to be close enough to the beach for swimmers to make direct attack, the swimmers generally being conveyed in some manner to within range of the target.

b. Surface Vessels. It is not desirable that surface vessels be used to position sneak attackers, for they must approach the target close enough to be within easy radar or visual range, so the attack is given away. In fact, one of the most flagrant artificialities of the UDTsLant sneak attack exercises to date has been the necessity for making use of LCP(R)'s and/or IB(R)'s to position swimmers for their attacks. It is easy to see that these craft are very susceptible to detection by radar, search light, patrol boat, etc., and would not be used by other than a suicidal enemy. Yet most of the successes which have been claimed by the targets in the exercises have been captured by LCP(R)'s or IB(R)'s which seems to indicate the necessity for a rule governing such an unrealistic means of positioning attackers.

c. Aircraft. Use of this means of positioning is not anticipated in the immediate future. No consideration has been given to dropping sneak craft from aircraft, and since no UDT's are qualified in jump school, drops from helicopters seem to be the only means of positioning by aircraft available to UDTsLant and no plans for this have been made.

d. Submarine. It is very possible that submarines may be used to position swimmers. Perhaps the greatest limitation on delivery of sneak attacks at this time is lack of sneak craft, so that maximum use of submarines may not be made. However, in certain suitable situations a carefully handled fleet submarine may be maneuvered to within swimmer range of targets. The main limitation at this time to an attack of this nature is the difficulty which the

swimmer has of returning to the submarine after the attack, and this limitation is so serious that if it is at all possible, the attack is planned so that the swimmer can swim to friendly forces ashore or be picked up by surface craft after the attack. But both infra-red and sonic devices are developed almost to operational production, so that hopes are very promising for overcoming the homing problem in the very near future. However, when a fleet-size submarine is used for positioning swimmers, it should be noted that this is an artificiality which could be misleading; for the submarine is actually representing a sneak craft, though maneuverability in close quarters is much more limited and detection much easier than if it were a sneak craft. The rules for the exercise should take this into account.

2. APPROACH

a. Surface. All UDTsLant approaches will probably be surface, at least until just before the swimmers come into visual range of the sentries aboard the target. Although, as will be described below, some UDTsLant swimmers have been trained so that by using SCUBA's (self-contained underwater breathing apparatus) they are able to submerge to avoid patrol boat activity and to deliver the attack, the training required for their qualification is so extensive that their number is limited. Consequently on many occasions it is necessary for sneak attacks to be carried out by surface swimmers, who must swim all the way to the target to deliver their attacks. Such swimmers are, of course, vulnerable to illumination by lights hanging above the waterlines of targets and to detection by alert deck sentries. Thus this is an unrealistic element of the simulated sneak exercises, for presumably a potential enemy would be equipped at least with adequate SCUBA's.

b. Subsurface. UDTsLant is not equipped to execute a subsurface approach by means of a sneak craft. As mentioned above, limited numbers of UDTsLant swimmers are able to perform a partial underwater swimmer, submerging as necessary to avoid patrol activity and to attack the target. This technique is in fact, the most realistic form of simulated sneak attack that UDTsLant is able to deliver, and if properly executed is very difficult of detection. The only unrealistic element of the UDTsLant version of the underwater approach is the trail of bubbles that the SCUBA's now in use by UDTsLant swimmers leaves behind. It is very unlikely that a real sneak attack would involve use of such obsolete SCUBA's.

3. ATTACK

a. Towed Explosives. At present, simulated attacks with explosives towed by swimmers is the only form of sneak attack which UDTsLant is capable of executing. It is a valid assumption that any swimmer reaching the hull of a target undetected may be towing up to 300 pounds of high explosives with which to consummate his attack. UDTsLant surface swimmers simulate such attacks by igniting Mk 13 flares alongside the hulls of targets. Underwater swimmers may attach such flares, properly waterproofed to the anchor chains or,

rudder posts of targets, and the flares may be rigged with mechanical time delay firing devices set for such time delay as to allow escape of the swimmer. In the near future, time delay flares may also be attached magnetically to hulls, so that the attacker need only make contact with a target to consummate his attack and quickly make his escape. This method of delivering an attack has the advantage of affording positive proof of a successful attack having been delivered, even though the underwater flare is a dud, as is often the case; for the magnetic device is evidence that the swimmer reached the hull of his target.

b. Explosives carried by sneak craft. UDTsLant at present has no such craft.

c. Torpedoes. This form of sneak attack is not used by UDTsLant.

4. RETIREMENT

a. Return to Parent Vessel. At present the most reliable aid to UDTsLant swimmers homing to parent vessel (usually an LCP(R) or an IB(R)) is a hooded waterproof flashlight by means of which both boat and swimmer may make fine directional signals. If the parent vessel is a submarine, swimmers may reel out a line behind them as they swim, using it to guide their return after completing their attack. If this is not feasible, as it seldom is, it is usually friendly forces ashore or meet a surface craft after their attack has been completed. If swimmers, either surface or from a submarine rendezvous with an IB(R), some success has been realized with infra-red snooperscopes in homing on an LCP(R) or a submarine; but such gear has many limitations for UDT use, for which it was not designed. It has been promised UDTsLant that in the near future both improved infra-red (for surface) and sonic (for underwater) devices will be available for homing aids, but until such devices appear in operational form, homing aids, are likely to remain a major problem for UDTsLant sneak attackers.

b. Return to Base. It is seldom that a UDTsLant sneak swimmer will be able to return by swimming to a base. Usually water deep enough for an anchorage is so far off a beach that the sneak swimmer should return to a base, if probable that he will navigate by means of landmarks.

c. Pick-up by aircraft. This means of retirement has not been developed by UDTsLant.

B. DECEPTIVE

1. ESPIONAGE. This form of sneak attack is not, of course, restricted in use to UDTsLant. Its employment in the past by UDTsLant has been confined to placing men at target vessels by means of false orders and this subterfuge may again be used on appropriate occasion.

Since espionage is not a characteristic UDT attack, no further methods of its employment have been devised at present.

2. MASQUERADE

a. Disguised boats. This form of sneak attack may well be used by UDTsLant, for the most part of which was described previously. In fact, if exercise sneak attack rules for this do not take into consideration the unrealism in positioning swimmers by surface craft, some sort of boat disguise may be the only feasible means of closing the target close enough to launch swimmers, and could well be expected.

b. Captured Equipment. Use of "Captured Equipment" would depend entirely on the possibilities allowed by the rules for capturing of equipment, by UDTs, but if such a form of attack is possible, it should be expected.

9. The defenses which the ships of the U.S. Fleet have developed against the UDTsLant simulated sneak attacks are:

a. Searchlight manned throughout alert period, searching periodically; and close guard of radar.

b. Flycatcher net (in fleet operations)

c. Extra sentries posted so as to guard the entire problem of the waterline.

d. Patrol boats manned, circling target vessels continuously and often more than one boat circling in concentric circles out to as far as 500 yards.

e. Cargo lights suspended about 10 feet above the waterlines of targets at close enough intervals so as to illuminate their entire waterline, including the anchor chain and the rudders.

f. During the FLEX operation certain target vessels were observed to be turning their screws at intervals, though it is not known whether this was for the purpose of defending against sneak attackers.

g. Passwords were established for use by the flycatcher units and the patrol boats so as to aid in apprehending disguised surface craft.

During the FLEX operation, even considering the many conflicting claims and the widespread criticism of UDT tactics, it seems fairly clear that the above defenses were moderately successful in dealing with the STEALTHY type of sneak attacks that were simulated. However, it is felt that the claimed successes were attributed far more to the limitations of the exercises than to the effectiveness of the defenses against realistic sneak attacks. This conclusion is based on the following:

1. Due to the adverse conditions it was not possible to carry out an attack by underwater swimmers. Such attacks were planned by the IB(R)'s which were to position the swimmers were detected and apprehended before the swimmers could be all launched. Consequently the ships' defenses were never tested against an underwater attack.
2. Most of the successes which were claimed by the target vessels were scored during the "positioning phase" of the attack while the attackers were in LCP(R)'s or in IB(R)'s. It has already been pointed out that this is the most unrealistic phase of the sneak attacks which have been simulated by UDTsLant. Yet consideration of the defenses listed above will show that nos. 9a, 9 b, 9c, and 9d are directed mainly at this phase, and would have only a limited effect against underwater attackers.

It is feared that the results of exercises such as FLEX i.e., ill-defined results and unrealistic conditions, may give the ships of the U.S. Fleet a false sense of security by leading them to believe that they have evolved effective defenses against sneak attacks, when in reality their defenses are insufficient and indeed in some cases may even aid sneak attackers.

10. For sneak attack exercises in the future the following recommendations are made:

- a. The conditions for the exercise should be clearly defined, i.e., position and capabilities of own forces, position and capabilities of the enemy, duration of the alert, etc. Thus it may be that some of the defenses used heretofore may be modified in consideration of enemy forces (submarines, aircraft, etc.)
- b. Rules for the exercises should be clearly stated so that there may be no conflicting claims.
- c. Limitations of the exercises should be clearly stated so that there may be no conflicting claims. They should be made as clear as possible to the target ships so that the unavoidable unrealistic elements of the exercise may be properly regarded. Perhaps rules could be established so that when an underwater attack is executed the unrealistic surface elements, i.e., safety boats, surface positioning, etc., may be disregarded by the defenders. Otherwise as in FLEX, the defenses may not be properly tested against an underwater attack.
- d. Within the limits of security ships should be furnished with reliable information concerning the capabilities of well-executed sneak attacks, so that their defenses may be set up with these in mind. For example, they should realize that some of the best defenses against sneak attacks (e.g., use of small explosive charges, turning screws, etc.) from the standpoint of safety are not feasible in sneak exercises, and thus there are elements in the defensive limitations which are just as unrealistic as some phases of the attack.

11. It is generally felt by those who have had any experience at all in the field of sneak attacks that the possibilities for offensive operations against enemy shipping and harbor installations by means of sneak attacks are very considerable provided that the attackers are thoroughly prepared and equipped. The potential ratio of gain-to-expenditure is at least as high as for any other form of naval endeavor, and it has been proved by the Italians and the English that sneak attacks may succeed where other forms of attack fail. It is true that the possibilities for sneak attackers are not by any means unlimited, as shown by the experiences of the Germans. It is generally conceded that the Germans developed perhaps the best of sneak craft of World War II; but their successes with sneak attacks were negligible. The main reason for their disappointments seems to have been not the defenses of their enemies, but rather in the employment of the craft by the Germans themselves. The Italians and English found that use of sneak attacks was best limited to relatively enclosed waters, calm and warm, if possible. But the Germans attempted to use their craft as miniature submarines in the North Sea, and as result, lost the greatest part of the boats they sent out. However, if boats designed like those of the Germans were used in conjunction with fleet submarines in attacks on enemy shipping in harbors and on coastal installations, it is felt that rich return may be realized from investment in an organization whose primary mission is conduct of such attacks. Such an organization would most properly be under operational and administrative control of the department of submarines and would be supported by this department. Candidates for the unit might properly undergo preliminary training with UDT's and doubtless the nucleus for the unit when it is first formed could be taken from the present submersible operations platoons of UDT's for these men at present time are better qualified in operations with sneak craft than any other group of personnel in the U.S. Navy. It is felt that lack of development in this field would be, to say the least, an oversight of a potentially potent offensive possibility.

JAMES MOORE